8:15 0 **Introductions, Instructions, Steve Bauer; Opening Comments, Peter Davies**

8:30 1 **Hydrostatic model for nitrogen-capped storage caverns**
**Giorgia Bettin Geotechnology & Engineering**

8:45 2 **3D modeling of Waste Isolation Pilot Plant (WIPP) using PFLOTRAN**
**Heeho Park, Performance Assessment & Decision Analysis Dept and Todd Zeitler**

9:00 3 **Bubble It, Dissolve and Vaporize It, Zap It – Analytical Chemistry Applied to Geoscience Issues.**
**Curtis Mowry, Materials Reliability**

9:15 4 **GLINDA: Global Infrasound Network Detection and Association for processing IMS infrasound array data**
**Kyle R. Jones Ground-Based Monitoring R&E**

9:30 5 **Pore-scale velocity measurements in microfluidic pore networks using Particle Image Velocimetry (PIV) Kirsten Chojnicki , Geomechanics**

9:45 6 **Projecting the Impacts of Investment, Technology and Market Demand on Potential Shale Gas Supplies,**
**Peter Kobos, Earth Systems Analysis with La Tonya Walker, Len Malczynski, Dave Borns,**

10:00 7 BREAK

10:15 8 **Multi-Vendor Sonar Data Interpretation for Visualization and Volumetrics**
**Paula Weber, Geotechnology & Engineering**

10:30 9 **Compaction Behavior of Waste Isolation Pilot Plant Emplaced Waste**
**Scott Broome, Geomechanics**

10:45 10 **Measurements and modeling for tracing the sources of gases and particles in the atmosphere**
**Ray Bambha Remote Sensing & Energetic Materials**

11:00 11 **Using muons to image the subsurface**
**Nedra Bonal, Geophysics and Leiph Preston, Dan Dorsey,**

**11:15 12 Modeling and Analysis of Energy Networks: Natural Gas and Petroleum Liquids**
**Tom Corbet, Policy and Decision Analytics, and Sasha Outkin, Craig Tenney,**

11:30 13 **Understanding the Big Hill Dome Surface Uplift: Historical InSAR Study**
**Anna Lord, Geotechnology & Engineering**

11:45 14 **The Geomechanics Missing Link: How to relate lab and field data.**
**Mathew Ingraham, Geomechanics**

12:00 15 **Developing a Characterization Plan for the Deep Borehole Field Test**
**Kris Kuhlman Applied Systems Analysis & Research**

**Hydrostatic model for nitrogen-capped storage caverns**
**Giorgia Bettin Geotechnology & Engineering**

The Strategic Petroleum Reserve manages more than 60 underground caverns in salt domes. Caverns are used to store crude oil and their structural integrity is of the most importance. When small leaks are suspected nitrogen is injected into the caverns for more accurate monitoring. This project aims to accurately model cavern pressure behavior, as well as nitrogen oil interface movements for each modeled cavern and aid in the early detection of product leak into the environment.

**3D modeling of Waste Isolation Pilot Plant (WIPP) using PFLOTRAN**
**Heeho Park, Performance Assessment. & Decision Analysis Dept and Todd Zeitler**

The WIPP performance assessment (PA) calculations estimate the probability and consequence of potential radionuclide releases from the repository to the accessible environment for a regulatory period of 10,000 years after facility closure. PFLOTRAN would like to replace the functionalities of five computer codes in the WIPP PA to calculate porous media flow and transport in and around the repository. Most of the conceptual models that WIPP PA considered are implemented at this point. Therefore, we plan to spend the last 4 months of this fiscal year to come up with a lumped WIPP simulation domain to compare with fine resolution model that completed on a super-computer like 'Red-Sky'. This is because the WIPP PA simulations are preferably done at Sandia-Carlsbad on its own set of Solaris clusters which are monitored under quality assurance (QA) program of WIPP.

**Bubble It, Dissolve and Vaporize It, Zap It – Analytical Chemistry Applied to Geoscience Issues.**
**Curtis Mowry, Materials Reliability**

Measure it. That's what we do in Materials Reliability 1852. Gas, liquids, solids – molecules or elements. We get excited by the challenging non-routine measurements that Sandian's need every day. Our goal is to provide analytical expertise, provide real answers, and bring advanced tools to bear – so you don't have to. I'll present examples of measurements of water, additives, and gases relevant to geoscience.

**GLINDA: Global Infrasound Network Detection and Association for processing IMS infrasound array data**
**Kyle R. Jones Ground-Based Monitoring R&E**

This GLINDA initiative is a Department of State Contribution in Kind funded effort to independently process IMS infrasound array data and compare the associated results with the CTBTO's official event database. The primary purpose of this effort is to use and test a LANL developed infrasound array processing program coded in python called InfraPy. We hope that, if successful, the algorithms and techniques used in InfraPy will be used at AFTAC for real-time infrasound array processing.

**Pore-scale velocity measurements in microfluidic pore networks using Particle Image Velocimetry (PIV) Kirsten Chojnicki**

To enhance our understanding of CO2 behavior in heterogeneous porous media at meso-scales we will measure 3-D single and multiphase flow fields in microfluidic devices using PIV. We will compare flow characteristics from regular and irregular geometries to evaluate the impact of spatial variations in pore structure on flow dynamics. We are interested in learning the conditions under which behaviors such as capillary channels emerge.

**Projecting the Impacts of Investment, Technology and Market Demand on Potential Shale Gas Supplies,**
**Peter Kobos, Earth Systems Analysis and La Tonya Walker, Len Malczynski, Dave Borns,**

Projecting natural gas production in the United States due to Shale Gas discoveries is rapidly changing the energy investment profile throughout the economy. Our ongoing work employs system dynamics to incorporate continuous feedback and market assessments. By doing so, the quantitative model returns reasonable matching of historic production rates for shale gas, conventional natural gas and coalbed methane and may be used to identify future trends in investment and technologies required to meet natural gas demand.

**Multi-Vendor Sonar Data Interpretation for Visualization and Volumetrics**
**Paula Weber, Geotechnology & Engineering**

Description - Consistent interpretation of sonar data in the roof and floor regions of the Strategic Petroleum Reserve (SPR) caverns is vital with the potential decommissioning of several caverns. The time series of the cavern geometry is also important as changes and specifically the region of change may indicate current and future necessary remediations. However, multiple sonar vendors and their accompanying software does not facilitate cross-vendor comparison therefore Chris Rautman developed and maintained Sonar7 in the early 2000s which is now being updated to a modern coding language (Python) in order to handle the more complicated roof and floor regions.

**Compaction Behavior of Waste Isolation Pilot Plant Emplaced Waste**
**Scott Broome, Geomechanics**

The current Waste Isolation Pilot Plant waste model contains certain technical issues. The primary issue with the current model is observed radial compaction of waste drums when only uniaxial loading is applied. With a target completion date of May 2015, the Geomechanics laboratory will perform hydrostatic, uniaxial and triaxial loading tests on ¼-scale and hydrostatic and uniaxial loading tests on full scale 55 gallon drums while measuring all three principal stress and strain components facilitating parameterization of an improved waste constitutive model.

**Measurements and modeling for tracing the sources of gases and particles in the atmosphere**
**Ray Bambha Remote Sensing & Energetic Materials**

We are developing techniques to attribute atmospheric trace gases and particles to their sources using measurements of multiple species and inverse modeling. Our current projects focus on methane and black carbon in the Arctic. Other areas where these techniques can be applied include measurements of fugitive methane emissions from oil and gas extraction and attribution carbon dioxide emissions to their sources.

**Using muons to image the subsurface**
**Nedra Bonal, Geophysics and Leiph Preston, Dan Dorsey,**

Muons are naturally occurring elementary particles that can penetrate the earth for several kilometers. Muon flux and scattering is related to the density of the materials through which they pass. Measurements of muon flux and/or scattering are used to construct images of the materials and estimate their densities.

**Modeling and Analysis of Energy Networks: Natural Gas and Petroleum Liquids**
**Tom Corbet, Policy and Decision Analytics, and Sasha Outkin, Craig Tenney,**

We outline a set of efforts funded by NISAC and LDRD to model the energy systems. These efforts include an LDRD to create an agent-based model of the U.S. Natural Gas (NG) Infrastructure, a NISAC effort to use the commercial NG model (GPCM) to understand disruption scenarios, and an effort for NISAC and DOE programs to simulate performance of petroleum infrastructure in the U.S. and other global regions. This suite of models allows understanding the energy systems normal and disrupted operation on the time scales from days to years and understanding the effects of different disruptions on the network performance.

**Understanding the Big Hill Dome Surface Uplift: Historical InSAR Study**
**Anna Lord, Geotechnology & Engineering**

Since 2002, at the U.S. Strategic Petroleum Reserve Big Hill salt dome site, there has been an ongoing trend of measured surface uplift. In order to better understand the subsurface dynamics, historic interferometric synthetic aperture radar (InSAR) data were acquired. Our analysis of the InSAR data confirmed the validity of the subsidence trends shown by the historic monument subsidence data, and also provided new insight into the possible geologic forces responsible for the measured surface deformation.

**The Geomechanics Missing Link: How to relate lab and field data.**
**Mathew Ingraham, Geomechanics**

One of the greatest criticisms of laboratory geomechanical testing is that the tests do not represent field conditions. Results from laboratory experiments typically require loads 2-4 times higher than the material ever experienced in the field to generate failure features such as compaction bands. The typical experimental constrains of boundary conditions and small specimen size are obvious culprits, but it is also a fundamental material difference. Rocks cored from the field are almost never the same (geochemically, geomechanically, etc.) as they were when a feature in question formed, how can we solve this problem to allow for better development of models which have more relevance to field applications?

**Developing a Characterization Plan for the Deep Borehole Field Test**
**Kris Kuhlman Applied Systems Analysis & Research**

The deep borehole radioactive waste disposal concept is being pursued by the Department of Energy office of Nuclear Energy for a field demonstration in 2016. The concept involves putting radioactive waste in the bottom 2 km of a 43-cm diameter 5-km deep borehole drilled into crystalline basement rock. We are currently developing a characterization plan to both describe both how a future disposal site would be characterized and how the current field test (no radioactive material) will be studied.